PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No. : 10/002,080
Applicant : Kevin S. Stein et al
Filed : October 31, 2001
Title : Soft Contact Roll For A Single Facer

TC/A.U. : 1733
Examiner : Gladys J. Piazza Corcoran

Docket No. : 4470-00613

SUPPLEMENTAL DECLARATION OF PRIOR INVENTION
PURSUANT TO 37 CFR §1.131

Commissioner of Patents
P.O. Box 1450
Arlington, VA 22313-1450

Sir:

I, Dennis L. Lemke, declare as follows:

1. I am a co-inventor of the subject matter claimed in this application and am the declarant in the prior declaration dated 10 February 2004 and filed with a prior response on 16 February 2004.

2. The drawing identified in paragraph 4. of my prior declaration is shown in operative contact with a large diameter bonding roll depicted by a large diameter circular arc shown in phantom lines. This phantom line bonding roll is the bonding roll of a single facer machine and corresponds exactly to bonding roll 12 described and shown in the drawings in our subject application. Thus, the note on that drawing stating that "the roll rides up against the bonding roll with light loading (about 5 pli)" refers to the loading

applied to the single face web 17 held against the surface of the bonding roll 12, as described in lines 31-33 on page 5 of the subject application. This drawing also shows, in a solid line depiction, the generator roll 15 that carries the single face web 17 into contact with the bonding roll 12 in the single facer.

3. The drawing referred to in paragraph 5. of my prior declaration shows the apparatus of our invention mounted on a cross frame member 30 and side frame members 31 with the generator roll 15 mounted directly below in operative association with the bonding roll of a single facer. Thus, the phrase in the fourth paragraph of the "ASSEMBLY INSTRUCTIONS" of that drawing which states in part ". . . actuate the soft contact roll into the bonding roll" refers to the contact roll 18 of the present invention and the large diameter bonding roll 12 of a single facer as described in our application.

4. All of the essential elements of the apparatus of our invention and the manner in which it operates on a single facer apparatus are shown in the two drawings submitted with my prior declaration or are clearly obvious in view of that showing.

5. With respect to paragraph 7. of my prior declaration, I and my co-inventor, Kevin S. Stein, actually reduced our invention to practice by operating and testing a prototype apparatus on a single facer prior to October 9, 2001. Attached Exhibit A is a report summarizing the successful test of our soft contact roll on a single facer machine. Although the dates of the test and the report have been deleted, both occurred prior to October 9, 2001.

6. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the

United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated this 25 day of August, 2004.

Dennis L. Lemke

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EXHIBIT A

To: Kevin Stein
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Subject: Soft Contact Roll Test Results

The second set of tests were performed on the soft contact roll (a.k.a. the pressure roll, auxiliary nip roll, low pressure roll, etc) on Monday and Tuesday .

The detailed test data is included in the two attached spreadsheets: proll809 contains all of the quality test results and gbp_pl1 contains all of the bonding roll current results.

had been running the soft contact roll during C-flute production on there #2 corrugator in Green Bay for one week prior to our most recent visit. The roll had some XMD lines melted into the cover which were caused by the roll having been left engaged when the bonding roll was stopped. There were no other visible forms of wear on the soft contact roll. The roll was automated on Tuesday, to help prevent any more premature wear caused by leaving the roll engaged when the bonding roll is not rotating.

Three different set of tests were conducted: wrap roll test, starch reduction, and generator roll tests.

WRAP ROLL TEST
The wrap roll test consisted of taking samples with the wrap roll at different heights to help us determine the necessary bonding roll diameter. A few speed tests were performed with the wrap roll in the full up (minimum wrap, 37") and full down (maximum bonding roll wrap, 0"). In only one instance, soft contact roll disengaged and wrap full up, was delamination noticed. In all other instances, the machine was run up to 900fpm with no signs of catastrophic web delamination.

The pin adhesion results for the wrap roll test are as follows:

26R-26M-26R Pin Adhesion Summary

Wrap Roll Height (in")	0(w/o nip roll)	0	10	15	20
Average Pins (lbf/in)	32.4	40.3	40.7	40.6	40.3

69K-26M-69K Pin Adhesion Summary

Wrap Roll Height (in")	0(w/o nip roll)	0	20	25	35
Average Pins (lbf/in)	50.8	68.2	68.9	66.4	67.9

Based on these results little change in the pins is induced by raising or lowering the wrap roll. However, more testing should be conducted to determine the impact on top speed when the wrap roll is in the full up position.

STARCH REDUCTION TEST
The starch reduction test was conducted to help us better understand the relationship between decreasing the doctor roll gap and the pin adhesion and the glue transfer from the medium to the liner. In this test the soft contact roll was disengaged and samples were taken at a doctor roll gap of 0.018", 0.015", and 0.012". The same was done with the soft contact roll engaged. The results:

Pin Adhesion Summary (26M-42K)

Doctor Roll Gap (in)	0.018	0.015	0.012	0.018	0.015	0.012
Soft Contact Roll (pli)	0	0	0	5.5	5.5	5.5
Average Pins (lbf/in)	48.8	45.7	43.9	51.1	48.1	45.8
Percent Change (%)	0	-6.4	-10.0	0	-5.9	-10.3

Glue Line Summary (same tests as above)

Doctor Roll Gap (in)	0.018	0.015	0.012	0.018	0.015	0.012
Soft Contact Roll	0	0	0	5.5	5.5	5.5
Ave Med Thick (in)	0.086	0.080	0.073	0.079	0.081	0.069
Ave Lnr Thick (in)	0.053	0.048	0.046	0.071	0.071	0.060
Lnr to Med Glue	61.1%	60.2%	63.9%	90.5%	87.9%	87.2%

As can be seen by the results above, the pins lowered slightly with the reduction in the glue gap. More importantly, however, is that a much higher glue line transfer from the medium to the liner was incurred when the soft contact roll was engaged. This may allow us to apply less starch to the medium yet still achieve adequate pin adhesion results which could help minimize, among other things, starch consumption, washboarding, blistering, and cockling.

GENERATOR ROLL TEST

The generator roll test was conducted to help determine the impact the generator roll has on the pin adhesion. In this test, the generator roll was "disabled" by commanding it to run at 99.5% of bonding roll speed and at 10% of its torque limit (normally 95% of bonding roll speed and 100% of torque limit). In essence, we wanted the generator roll to act as an idler roll, yet maintain the capability of quickly re-enabling the roll if any problems were induced by the lower liner tension. The results:

Pin Adhesion Summary (lbf/in)

Test	1	2	3	4
Generator Roll	Disabled	Disabled	Enabled	Enabled
Auxiliary Roll	Disengaged	Engaged	Engaged	Disengaged
Average Pins	51.1	59.0	59.2	52.7

These numbers indicate the generator roll has little impact on the pin values. They do not, however, indicate any hindrance or change to the top speed or runnability of different papers.

The impact of the generator roll on the required bonding roll current is as follows:

generator roll (lbs.)	% gen. roll current	liner web tension	% bonding roll current	bonding roll rpm
0	0%	326	43	482
50	11%	326	47	482
110	26%	326	49	482
220	50%	326	52	482
330	76%	326	59	484
440	100%	274	62	468

A dramatic increase in the required bonding roll current was incurred by lowering the torque allowed to the generator roll.

SUMMARY

To summarize each of the tests:

WRAP ROLL TEST

- the pins seemed unaffected by raising the wrap roll from full wrap to virtually no wrap
- no significant tests were conducted to determine the impact the wrap roll has on top speeds and the "process robustness" of the machine. There was one instance where total delamination was incurred at aout 400fpm when the soft conact roll was disengaged, the wrap roll at no wrap, and the splicer dancer was oscillating due to a recent splice which produced significant tension variations in the incoming liner web. The delamination would not have occurred had the wrap roll been in its full down position.
- recommend further long-term testing where the wrap roll is left in the full up position for a period of time and process reliability

can be assessed more definitively

STARCH REDUCTION TEST
- the pins decreased by 10% from 0.018" to 0.012" doctor roll gap both with and without the soft contact roll engaged and disengaged
- the medium glue line thickness changed most from 0.015" to 0.012"
- roughly 25% more of the medium glue line is transferred to the liner when the soft contact roll is engaged as opposed to disengaged
- recommend another set of tests identical to the tests summarized here to help substantiate the findings, also recommend a test to reduce starch even further and assess the quality of the board

GENERATOR ROLL TEST
- the pins remained virtually unchanged with and without the generator roll enabled
- the generator roll has a significant impact on the required bonding roll current
- recommend long-term testing with the generator roll disabled to help determine impact on process robustness with an eye on elminating a driven generator roll on future machines